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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,505	02/10/2004	Jathan D. Edwards	10414US01	1478

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Attention: Eric D. Levinson
Imation Corp.
Legal Affairs
P.O. Box 64898
St. Paul, MN 55164-0898

EXAMINER	
BOUTSIKARIS, LEONIDAS	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/775,505	EDWARDS, JATHAN D.	
	Examiner	Art Unit	
	Leo Boutsikaris	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-13 and 15-19* is/are rejected.

7)☒ Claim(s) *3,14 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/21/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1-20 are objected to because of the following informalities:

Claims 1-20 recite the phrase "input light source". It is suggested that the above phrase is changed to "input light beam", to avoid any confusion as to whether the "interior" and "perimeter" terms refer to the input light beam or to the actual physical structure of the light source.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 4-10, 13, 15-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (US 6,775,037).

Regarding claims 1, 8, 13, 18, Lee discloses an optical holographic recording system wherein a light beam 402 from an input light source is incident on polarizing beam splitter 403 and subsequently is incident on spatial light modulator 404. One controllable portion 405 of the

SLM produces a data encoded object beam 420 and a second controllable portion 406 of the SLM produces an encoded reference beam 421, the object and reference beams being combined at the recording medium 409 (Fig. 4(a), line 64, col. 4 to line 23, col. 5).

Regarding claims 2, 15, the SLM 404 comprises controllable optical elements, such as cells, which are controllable by applying external voltage (lines 11-19, col. 5).

Regarding claims 4-5, the first portion of the SLM defines a bit map in the encoded object beam 420, and the second portion may be considered as being a reference mask effecting the reference beam 421.

Regarding claims 6, 16, in one embodiment, the LCD panel 802 is a transmission SLM (Fig. 8, lines 36-47, col. 7).

Regarding claims 7, 17, the SLM 404 is in a reflective mode (Fig. 4(a)).

Regarding claims 9-10, after the first set of object/reference beams has been used to record a first hologram in the medium 409, the medium is moved to a next position and a second set of object/reference beams is used to record a second hologram (lines 23-26, col. 5). In general, the two sets of encoded beams are different from each other.

Regarding claim 19, the system of Lee further includes a laser for producing the input light beam (lines 40-41, col. 9), and one or more optical elements to condition the input light beam, i.e., to collimate it (lines 65-66, col. 4).

Claims 1-2, 4-6, 8-10, 13, 15-16, 18-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Holmes (US 6,753,989).

Regarding claims 1, 8, 13, 18, Holmes discloses an optical holographic recording system wherein a light beam 9 from an input light source is incident on a spatial light modulator 1. One controllable portion of the SLM produces a data encoded object beam 10 and a second controllable portion of the SLM produces an encoded reference beam 11, the object and reference beams being combined at the recording medium 3 (Fig. 2, lines 36-47, col. 3).

Regarding claims 2, 15, the SLM 1 comprises controllable optical elements, such as cells, which are controllable by applying external voltage (lines 1-2, col. 4).

Regarding claims 4-5, the first portion of the SLM defines a bit map in the encoded object beam 10, and the second portion may be considered as being a reference mask effecting the reference beam 11.

Regarding claims 6, 16, in one embodiment, the LCD panel 1 is a transmission SLM (Fig. 2).

Regarding claims 9-10, after the first set of object/reference beams has been used to record a first hologram in the medium 3, the medium is moved to a next position and a second set of object/reference beams is used to record a second hologram (see Abstract). In general, the two sets of encoded beams are different from each other.

Regarding claim 19, the system of Lee further includes a laser for producing the input light beam (inherent), and one or more optical elements to condition the input light beam, i.e., to collimate and expand it (lines 38-39, col. 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 6,775,037).

Lee discloses all the limitations of the above claims except for specifically teaching that the various holograms are spatially multiplexed in the same location by using reference beams with uncorrelated phase content. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above method for spatially multiplexing holograms, since Official Notice is taken that spatial multiplexing using uncorrelated reference beams is widely used in the art of holographic multiplexing, since said method requires minimal movement of any optical elements (thus alleviating the need of precise aligning of the optical system).

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US 6,753,989).

Holmes discloses all the limitations of the above claims except for specifically teaching that the various holograms are spatially multiplexed in the same location by using reference beams with uncorrelated phase content. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above method for spatially multiplexing holograms, since Official Notice is taken that spatial multiplexing using uncorrelated reference

beams is widely used in the art of holographic multiplexing, since said method requires minimal movement of any optical elements (thus alleviating the need of precise aligning of the optical system).

Allowable Subject Matter

Claims 3, 14, 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 3, 14, 20 are allowable over the prior art of record for at least the reason that even though the prior art discloses holographic recording systems where the object and reference beams are along the same axis, and on the same side of the recording material, the object and reference beams being created by different portions of the same spatial light modulator, the prior art fails to teach or reasonably suggest, regarding claim 3, a method comprising creating an object beam from a first set of controllable optical elements forming an interior portion of a spatial light modulator, and a reference beam from a second set of controllable optical elements forming a perimeter portion of the spatial light modulator, and regarding claims 14, 20, a spatial light modulator comprising a first set of controllable optical elements forming an interior portion of the spatial light modulator to create an object beam from an input beam and a second set of controllable optical elements forming a perimeter portion of the spatial light modulator to create a reference beam from the input beam, as set forth by the claimed combination.

Nishiwaki (US 5,307,184, Fig. 8(c)) discloses a system wherein the mask 8b is a passive element, lacking any controllable optical elements e.g., cells, as it is the case with conventional electrically or optically addressed SLMs, and there is no suggestion or motivation to replace the mask with an SLM in the above system.

Edwards (US 6,762,865, Fig. 3) discloses a holographic recording system wherein the object and reference beams are along the same direction on the same side of the recording material, by separating the Fourier components of the object beam *after* it passes through the SLM. Similarly, Edwards (US 6,538, 776, Fig. 4) creates the above arrangement for the object and reference beams by reflecting the zero frequency Fourier component of the object beam to create a reference beam.

King (US 2003/0039001, Fig. 6A) discloses a holographic recording system wherein a (separate) reference beam 618 is made to be reflected off an annular mirror 604 adjacent to the SLM 602, so that object and reference beam are coincident.

Long (US 6,222,650, Fig. 1) discloses a system for recording holograms, wherein the +/- 1 diffraction orders of light passing through the SLM 68, are used to create the object and reference beams.

Finally, Orlov (US 6,108,110, Fig. 1) discloses an optical holographic recording system, wherein the object beam is created by an SLM 12 and the reference beam is created by a diffuser 28 positioned in the perimeter of the SLM.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leo Boutsikaris, Ph.D., J.D.
Primary Patent Examiner, AU 2872
November 26, 2005

LEONIDAS BOUTSIKARIS
PRIMARY EXAMINER